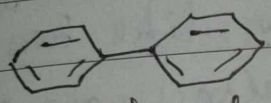
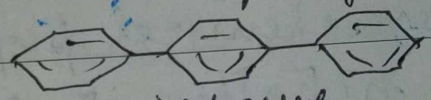
10.2.24

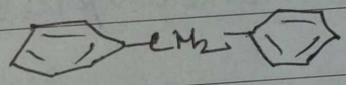
POLYNUCLEAR HYDROCARBON

compound contains more than one aromatic rings are called polynuclear H.C.
They are classified into two groups.

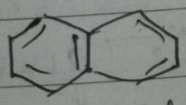
(a) Isolated polynuclear H.C.
Compounds in which the rings are linked directly to each other or one or more carbon atoms are called isolated polynuclear H.C.

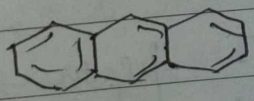

Diphenyl


Triphenyl

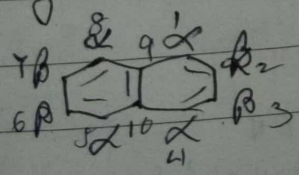

Diphenyl methane

(b) Fused Polynuclear H.C.
Compounds in which two rings are fused due to sharing of two or more carbon atoms by two or more rings


Naphthalene


Anthracene

Naphthalene is the simplest H.C. fused with two benzene in ortho position



Properties → They are colourless, insoluble

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Saturday, June 02

in water but soluble in organic solvent. It is less aromatic than benzene. It undergoes addition and substitution product.

Structure of Naphthalene ($C_{10}H_8$)

1. From analytical data and mol. wt. determination the mol. formula of naphthalene has been found to be $C_{10}H_8$
2. It resistant to addition reaction though less than benzene. It resemble benzene in other chemical properties like ~~ben~~ halogenation, nitration etc and also undergoes electrophilic and nucleophilic substitution reaction.
3. Its nuclear substituted hydroxy derivative are phenolic in nature and amino derivative undergoes diazotisation and coupling reaction. This shows that similar to the benzene in structure.

. On oxidation with permanganate gives phthalic acid. (O-benzene dicarboxylic acid). This shows that at least one benzene ring present in naphthalene and there is two side chains in ortho position to each other.

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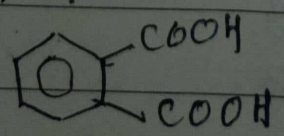
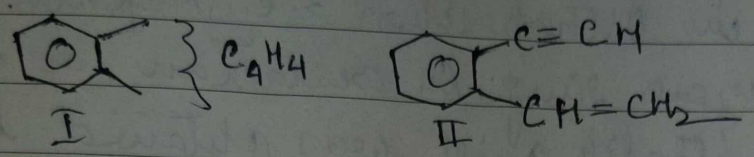
$$C_{10}H_8 \xrightarrow[[O]]{KMnO_4/H^+}$$ 

The formula of naphthalene may be written as (I). The two side chains on the ~~valence~~ basis of valency requirement must be highly unsaturated and formula (II) may be suggested.



However such structure would be contrary to known aromatic character of naphthalene. Therefore str (II) is ruled out.

(5) It was proved that naphthalene consists of two benzene rings fused in o-position. This was based on the following facts.

On oxidation naphthalene gives phthalic acid when naphthalene was nitrated gives nitro-naphthalene which on oxidation gives 3-Nitro phthalic acid. This shows that nitro group is present in the benzene ring and the side chain were oxidised. But when nitro group of nitronephthalene was reduced to amino group and the resulting aminonaphthalene oxidised to phthalic acid and not aminophthalic acid was obtained. It was concluded that during the oxidation of amino-naphthalene, it was benzene ring containing an amino group

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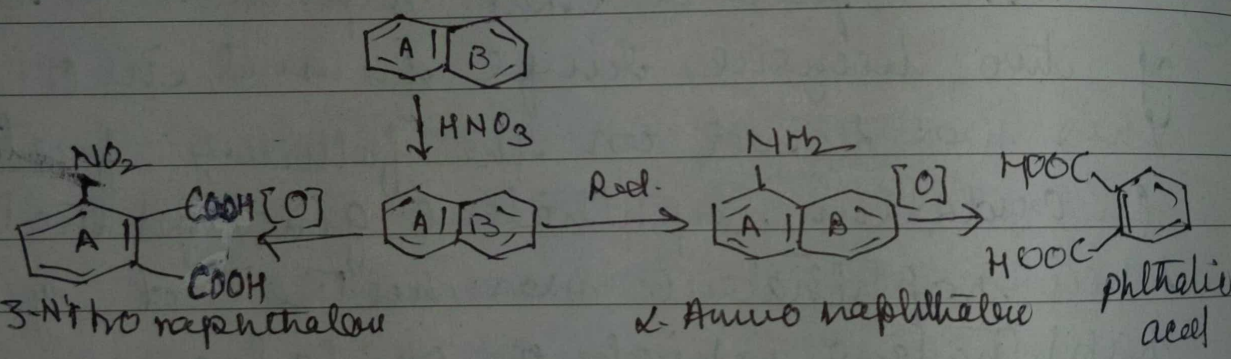
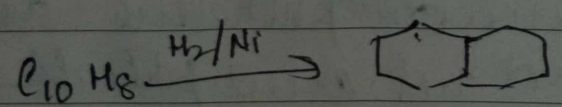
which was destroyed and the benzene ring present in oxidation product phthalic acid is other than that which had the nitrogroup. It may therefore concluded that two benzene ring was fused in orthoposition i.e. Naphthene contains two benzene ring. On oxidation of nitro naphthene nitro phthalic acid was obtained because nitro group is attached to benzene ring made the ring resistant to oxidation.

Naphthalene



The above structure clearly indicate the presence of two benzene ring fused in ortho position.

6. On reduction absorbs five molecule of hydrogen forms decalin. It indicate the presence of five double bond



This suggests that two mono substituted (α & β) and ten disubstituted derivatives.